

THE MINERAL INDUSTRY OF GREECE

By Harold R. Newman

The mineral industry, which consisted of the sectors that mine and process metallic and nonmetallic minerals, was a small but important part of the national economy. Mineral concentrates of lead and zinc were produced from processing base-metal massive sulfide ores from northern Greece, alumina and aluminum from karstic bauxite resources, and ferronickel alloy from laterite-derived sedimentary nickeliferous iron ores. These were the main products of metal mining and processing. Steel production was from imported scrap.

Greece has a land area of 130,800 square kilometers; borders the Aegean, Ionian, and Mediterranean Seas; and is located between Albania and Turkey. In 2003, the gross domestic product (GDP) at purchasing power parity was \$205.5 billion, and per capita income was \$18,733. The annual growth rate was estimated to be 3.7%; the inflation rate, 3.6%, and the unemployment rate, 9.8% (International Monetary Fund, 2004^{§1}).

Government Policies and Programs

Greece's economic growth was being driven in part by infrastructure construction for the August 2004 Olympic Games. In spite of Olympic-related investment, Greece has not attracted as much foreign direct investment as was anticipated by Government planners. This was due, in part, to security concerns related to the left-wing terror group called November 17, which has carried out numerous attacks on foreign-owned businesses. In addition, a relatively small industrial base, the lack of adequate investment in an underdeveloped communications and transport infrastructure, a relatively high tax burden, and the distance from other European Union (EU) markets has effected investments (U.S. Energy Information Administration, 2003§).

Environmental Issues

Environmental concern is the responsibility of the Ministry of Environment, Town Planning, and Public Works. The Government takes an active role in environmental protection. The general laws that have been enacted by the Government include law 1360/76 (Site Arrangement and Environment), Presidential Executive Order 1180/81, and law 1650/86 (Environmental Protection) form the basis of the active legislative framework. To comply with EU Order 88/609 concerning emission limitations, the Government executed Ministry Decision 58751/2370/15.4.93, which included the limits of the main pollutants from electricity-generating plants. Because northern Greece was thought to contain a significant amount of exploitable mineral resources, it received the most attention in exploration activities. In 2003, most activities continued to be directed toward gold.

Production

In terms of value of production, bauxite was the most important of Greece's mineral commodities. Greece was the leading producer of bauxite, magnesium, nickel, and perlite in the EU (table 1). Indices of production for the minerals sector are listed in table 2. The country's mineral-processing industry was relatively small as was the demand for and consumption of mineral products. Major commodities and companies are listed in table 3.

Trade

Exports in the first 9 months of 2003 totaled 8.8 billion euros (€) (\$9.9 billion). This was an increase of 6.2% compared with the same period in 2002. Imports totaled €29.5 billion (\$33.1 billion); this was an increase of 23% compared with the same period in 2002. The higher imports probably reflected increased needs because of the 2004 Olympic Games (Embassy of Greece, Washington, DC, 2004§).

Commodity Review

Metals

Aluminum.—Aluminium de Grèce S.A. established its plant in 1960 at Agios Nikolaos on the northern coast of the Gulf of Corinth to take advantage of the important bauxite deposits for the production of alumina and aluminum. The site combines proximity to the large bauxite deposits of Beotia and Phokifda, which were mined by Delphi-Distomon S.A. (a subsidiary of Aluminium de Grèce), and sea transportation facilities. The company produced bauxite, hydrated and calcined alumina, and aluminum metal produced through electrolysis. Aluminium de Grèce's finished aluminum was marketed to automobile manufacturers and makers of building

¹References that include a section mark (§) are found in the Internet References Cited section.

materials and packaging. The alumina and primary aluminum was marketed locally and to countries in the EU, primarily France and Germany (Yahoo, 2003§).

Bauxite.—Bauxite mining and processing continued thru 2003. Delphi-Distomon produced about 1 million metric tons per year (Mt/yr), which was sold to Aluminium de Grèce's operation at Boeotia. Although the bauxite ore had an average alumina content of 53%, it also had a high silica content that made it hard to process. The company maintained its refinery's production of 750,000 metric tons per year by mixing the local ore with other bauxite.

Gold.—In May 2003, TVX Hellas S.A. filed for bankruptcy and closed its mines in Halkidiki. This move followed a court ruling that gold could not be mined at the site on environmental grounds. The Cassandra Mines S.A.'s assets were bought by TVX Hellas in 1996 to exploit the refractory gold ores in the arsenopyrite stockpiles and the surface tailings by incorporating pressure oxidation technology into the ore-processing stage. TVX installed a processing unit for the gold deposit, modernized the mines and enrichment plant, and initiated a broad program for restoration and protection of the environment. Parallel objectives included continuing and modernizing the existing lead and zinc mining activities. This was one of the most important private investments made in recent decades in Greece (EIRO, 2003§).

A feasibility study, which incorporated a comprehensive financial model, to develop the Sappes gold mining project was completed and Greenwich Resources plc was going forward with the development of an underground mine in the high-grade Viper ore deposit and also an open pit mine on the St. Demetrious ore deposit. Estimated mineral reserves were 1.3 million metric tons (Mt) of ore at a grade of 16.3 grams per metric ton gold. As a reflection of the political climate in 2003 regarding the environment in Greece, cyanidation has been excluded from the project. A copper concentrate with very high grades of gold will be recovered by gravity and flotation techniques only. Gravity techniques will recover 15% of the gold that occurs as free gold, and 66% of the gold associated mainly with enargite will be recovered to a copper-gold concentrate by using flotation techniques. The concentrate will be exported to a foreign smelter where copper and gold would be recovered (Greenwich Resources plc, 2003§).

Nickel.—Larco G.M.M. S.A. was the only producer of nickel in Europe that used only domestic nickel ores. Larco had three main mining areas—Agios Ioannis (underground), Evia (open pit), and Kastoria (open pit). The ore is from a lateritic type of deposit and is part of a belt of mineralization that extends from Turkey to Albania. The ore grade ranges from 1.0% to 1.5% nickel. Around 80% to 85% of the ore was mined from open pit operations. Reserves have been estimated to last 40 more years at the current (2003) rated production (Larco G.M.M.S.A., 2003§).

Steel.—Corinth Pipeworks S.A. (CPW) was initially established to produce spiral-welded pipe for water transport. The oil and gas sector, however, has become its prime focus. CPW's plant at Corinth produced and coated, externally and/or internally with anticorrosive materials, medium-and large-diameter welded steel pipes and hollow sections. Its products were mainly intended for liquid or gaseous pipelines (Corinth Pipeworks S.A., 2003§).

CPW was the low bidder for Oman Gas Company's contract to supply 45 kilometers (km) of 24-inch X65 steel pipe for the Oman-United Arab Emirates natural gas link. The contract, which was worth \$6.1 million, was awarded in February (MEsteel, 2003§).

Industrial Minerals

Bentonite.—On September 9, 2003, Silver & Baryte Ores Mining Co. S.A. announced that its new name—S&B Industrial Minerals S.A.—was officially in effect. The change in name marked a new era and strategic focus on industrial minerals. S&B was the leading bentonite and perlite producer in Europe and the leading graded perlite supplier internationally (Capital Link Inc., 2003§).

Cement.—In August 2003, Titan Cement Co. S.A.'s new Rotary Kiln 4 clinker production plant came on line at the Efkarpia Tessaloniki plant. It was a 3,500 metric-ton-per-day (t/d) single preheater-kiln system that replaced the three 40-year-old long dry process kilns. The company was expecting a 30% reduction in fuel consumption while burning 100% petcoke, a 25% reduction in power consumption, and a drop in maintenance costs (World Cement, 2003).

Gypsum.—Lava Mining & Quarrying Co. S.A. specialized in extracting gypsum from the island of Crete, pozzolan from Milos, and pumice from the island of Yali.

Magnesite.—Grecian Magnesite S.A. was one of the leading magnesite producers in the western world. Its open pit mine was at Yerakini in northern Greece. After mining, the material was processed, beneficiated, and fed into rotary or shaft kilns for conversion to caustic or dead-burned magnesia.

Grecian Magnesite was adding two new mineral processing lines that were intended to increase productivity, to reduce production costs, and to improve the company's environmental protection efforts. As part of Grecian Magnesite's modifications, Bateman Project Holdings Ltd. supplied a new 30-metric-ton-per-hour dense-media separation plant that was designed to separate waste rock and to produce a high-grade magnesite at the Yerakini Mine (Grecian Magnesite S.A., 2003§).

Stone, Dimension.—In 2003, the Greek marble industry continued to play a leading role in the international dimension stone market as a result of continued marble production in almost all areas of the country, the variety of uses of the marble, and its many colors (ash, black, brown, green, pink, red, and multicolored). The marble industry was active in the quarrying, processing, and sale of blocks and finished products.

Zeolites.—S&B continued production of natural zeolite in northern Greece. The operation produced five grain sizes of clinoptilolite, which has a high cation-exchange capacity owing to its honeycomb crystalline structure.

Mineral Fuels

Coal.—Public Power Corporation (PPC) was the major producer of lignite, which was the predominant fuel in electricity generation in Greece. Most PPC lignite was produced from the Ptolemais-Amyntaion Basin; lesser amounts were produced from the Megalopolis Basin. Lignite reserves were estimated to be about 2,900 Mt (U.S. Energy Information Administration, 2003§).

Natural Gas and Petroleum.—Greece had limited natural gas and petroleum resources, but its Mediterranean location makes it conveniently close to several important producing regions, such as the Caspian area, the Middle East, and North Africa.

Turkey and Greece signed an agreement on interconnection of a natural gas network through a 280-km-long pipeline. Under the agreement, 209 km of the pipeline would be constructed in Turkey at an estimated cost of \$80 million and the rest of the pipeline would be constructed in Greece at an estimated cost of \$15 million. Transportation of natural gas through the pipeline was planned to start in 2006. Greece would receive 750 million cubic meters per year initially (Turkish Press, 2003§).

Motor Oil (Hellas) Corinth Refineries S.A. embarked on a \$334 million project to upgrade its 100,000-barrel-per-day (bbl/d) refinery to meet required EU fuel specifications starting January 2005. The project, which will be carried out by Technip-Coflexip S.A., included a new 37,000 bbl/d mild hydro cracker (30% conversion) integrated with a new 32,000 bbl/d gas oil-polishing unit, a 3-normal-cubic-meter-per-hour hydrogen plant and a 70-t/d sulfur recovery unit. Technip-Coflex will also revamp several process units that included a vacuum distillation unit and a diesel hydrodesulfurisation unit (Alexander's Gas & Oil Connections, 2003§).

Greece's largest company, Hellenic Petroleum S.A., operated three refineries—Aspropyrgos and Thessaloniki in Greece and at Skopje in Macedonia. The company had a dominant market share (56%) of the Greek oil refining industry. It also operated 1,400 gas stations (Yahoo, 2003§).

Greek waters were opened to foreign ferries in November 2003 as deregulation of coastal shipping continued to break domestic monopolies in accordance with EU directives. EU-flagged vessels may now bid to operate on Greek ferry routes. The new legislation was the first real step towards full deregulation required by the EU. Greece was the last of the EU nations to liberalize its coastal shipping regime (GreeceNow, 2004§).

Outlook

Greece is expected to remain a major supplier in the international market of certain industrial minerals. The economic impetus of the activities pertaining to the Olympics 2004 is expected to continue, albeit on a smaller scale.

Reference Cited

World Cement, 2003, Titan's latest modernization project: World Cement, v. 34, no. 4, April, p. 19.

Internet References Cited

Alexander's Gas & Oil Connections, 2003 (October 17), Motor Oil Hellas to upgrade Corinth refinery, accessed June 4, 2003, at URL <http://www.gasandoil.com/goc/company/cne34230.html>.

Capital link Inc., 2003 (September), Silver & Baryte Ores Mining Co. S.A. becomes S&B Industrial Minerals S.A., accessed June 3, 2004, at URL <http://www.capitallink.com/newpress/company/87533783/24390.html>.

Corinth Pipeworks S.A., 2003, Welcome, accessed June 3, 2004, at URL http://www.cpw.gr/main_en.html.

EIRO, 2003 (May), Controversy over closure of Halkidiki mines, accessed June 2, 2004, at URL <http://www.eeurofound.eu.int/2003/12/feature/gr032104f.html>.

Embassy of Greece, Washington DC, 2004 (February), Greek imports rose to record levels in 2003, accessed June 1, 2004, at URL <http://www.greekembassy.org/Embassy/content/en/articla.aspx?office=559&arti>.

Grecian Magnesite S.A., 2003, Modular DMS plant for Grecian Magnesite, accessed June 4, 2004, at URL <http://www.grecianmagnesite.com/press/pr20062000.html>.

GreeceNow, 2004 (February), Greece opens ferry market to foreign competition, accessed June 24, 2004, at URL <http://www1.greece.gr/BUSINESS/shipping/greeceopens.stm>.

Greenwich Resources plc, 2003, Review of Operations, Annual Report, accessed June 1, 2004, at URL <http://www.greenwichresourcesplc.com>.

International Monetary Fund, 2004 (April), Greece, World Economic Outlook Database, accessed June 1, 2004, at URL <http://www.imf.or/external/pubs/ft/weo/2004/01/data/index.htm>.

Larco G.M.M.S.A., 2003, Operations, accessed June 3, 2004, at URL <http://www.larco.gr/worksite/indexen.html>.

MEsteel, 2003 (February), Steel news in Oman, accessed June 3, 2004, at URL <http://www.mesteel.com/countries/oman/steelnews2.htm>.

Turkish Press, 2003 (December 24), Turkey and Greece sign agreement on interconnection of natural gas networks, accessed December 24, 2003, at URL <http://www.turkishpress.com/turkishpress/news.asp?ID=16272>.

U.S. Energy Information Administration, 2003 (September), Greece, Country Analysis Brief, accessed May 28, 2004, at URL <http://www.eia.doe.gov/emeu/cabs/greece.htm>.

Yahoo, 2003 (December), Aluminium de Grèce S.A., Company profile, accessed June 6, 2004, at URL <http://biz.yahoo.com/ic/100/100884.html>.

Major Sources of Information

Institute of Geology and Mineral Exploration
70 Messoghion Street
11527 Athens, Greece

Ministry of Development
Directorate of Raw Materials Mineral Policy, Section A
80 Michalakopoulou St.
10192 Athens, Greece

TABLE 1
GREECE: PRODUCTION OF MINERAL COMMODITIES^{1,*}

(Metric tons unless otherwise specified)

Commodity ²	1999	2000	2001	2002	2003 ^e
METALS					
Aluminum:					
Bauxite	1,882,505	1,965,561	1,931,497	2,468,865 ^r	2,418,000 ³
Alumina, Al ₂ O ₃	625,590	667,141	678,934 ^r	749,500 ^r	750,000
Metal:					
Primary	159,000	167,507	163,581 ^r	165,262 ^r	165,000
Secondary ^e	3,000	3,000	3,000	2,000	2,000
Chromite, run-of-mine	2,273	--	--	--	--
Iron and steel:					
Iron ore and concentrate, nickeliferous:					
Fe content ^e	600,000	575,000	575,000	600,000 ^r	600,000
Ni content	16,050	19,535	20,830	22,670 ^r	22,000
Metal:					
Steel, crude	951,000	1,088,000	1,281,000	1,835,000	1,800,000
Ferroalloys, ferronickel, gross weight	59,545	81,662	84,200 ^r	91,600 ^r	90,000
Ni content	12,964	17,470	17,675	19,230 ^r	19,000
Lead, mine out, Pb content	22,001	18,235	28,619	29,300 ^e	29,000
Manganese:					
Ore, crude: ^e					
Gross weight	990	330	90	100	100
Mn content	353	63	17	16	15
Concentrate:					
Gross weight ^e	345	60	20	20	20
Mn content	149	49	9 ^r	15	15
Nickel:					
Mine output, Ni content of laterite ore	16,050	19,535	20,830	22,670	21,410 ³
Metal, Ni content of ferronickel	13,462	17,126	20,573 ^r	19,500 ^r	18,000
Silver, mine output, Ag content	45,771	37,145	61,500	74,800	79,200 ³
Zinc, mine output, Zn content by analysis	19,619	20,336	20,461	33,000 ^r	30,400 ³
INDUSTRIAL MINERALS					
Abrasives, natural, emery ^e	8,000	8,000	8,000	8,000	8,000
Barite: ^e					
Ore, crude	-- ^r	-- ^r	-- ^r	-- ^r	--
Concentrate	200 ^r	100 ^r	100 ^r	10 ^r	--
Cement, hydraulic	14,365	15,463	15,500 ^e	15,500 ^e	15,000
Clays:					
Bentonite:					
Crude	1,049,657	1,148,694	1,258,872 ^r	1,056,598 ^r	1,100,000
Processed	186,716	41,367	26,297	15,806 ^r	16,000
Kaolin:					
Crude	64,931	54,226	60,075 ^r	57,885 ^r	60,000
Processed ^e	300	300	300	300	300
Feldspar	78,500	94,700	126,400	124,100 ^r	125,000
Gypsum and anhydrite	686,416	801,025	808,890 ^r	850,786 ^r	850,000
Magnesite:					
Crude	495,144	442,785	483,296	558,057 ^r	500,000
Dead-burned	39,965	33,945	30,113	48,220 ^r	40,000
Caustic-calcined	117,817	109,730	113,355	105,234 ^r	115,000
Huntite, crude ^e	18,000	19,451 ³	18,000	18,000	18,000
Nitrogen, N content of ammonia	119,697	121,200	56,500 ^r	66,100 ^r	123,300 ³
Perlite:					
Crude	777,898	817,825	840,660 ^r	838,997 ^r	850,000
Screened	435,431	503,929	449,139 ^r	515,715 ^r	550,000
Pozzolan, Santorin earth	934,933	935,450	1,308,131 ^r	950,000	950,000
Pumice	885,000	852,000	802,000 ^r	850,000	850,000
Salt, all types	176,867	244,709	208,776 ^r	126,118 ^r	150,000

See footnotes at end of table.

TABLE 1--Continued
GREECE: PRODUCTION OF MINERAL COMMODITIES^{1, *}

(Metric tons unless otherwise specified)

Commodity ²	1999	2000	2001	2002	2003 ^e
INDUSTRIAL MINERALS--Continued					
Silica ^c	126,000 ³	125,000	125,000	125,000	125,000
Sodium compounds: ^c					
Carbonate	750	750	750	750	750
Sulfate	5,000	5,000	5,000	5,000	5,000
Stone:					
Dolomite ^c	90,000	90,000	90,000	90,000	90,000
Marble cubic meters	178,199	191,130	202,069 ^r	200,000 ^e	200,000
Flysch ^c	80,000	80,000	80,000	80,000	80,000
Quartz, processed ^c	6,500	6,500	6,500	6,500	6,500
Sulfur: ^c					
S content of pyrites	9,500	9,600	9,500	9,500	9,500
Byproduct, natural gas and petroleum thousand tons	148 ^r	150 ^r	153 ^r	157 ^r	162
Talc and steatite	2,860	2,300	2,073	670	1,000
Zeolites ^c	-- ^r	-- ^r	-- ^r	-- ^r	--
MINERAL FUELS AND RELATED PRODUCTS					
Coal:					
Lignite thousand tons	61,861	64,026	66,987	71,074 ^r	72,000
Lignite briquets ^c	34,000	34,000	34,000	35,000 ^r	35,000
Gas: ^c					
Manufactured, gasworks million cubic meters	15	15	15	15	15
Natural do.	21 ³	36	36	36	36
Natural gas plant liquids thousand 42-gallon barrels	140 ^r	140 ^r	140 ^r	140 ^r	140
Petroleum:					
Crude do.	1,200 ^e	2,093	1,435	1,417 ^r	1,400
Refinery products:					
Liquefied petroleum gas do.	6,415	8,886	8,839 ^r	8,909 ^r	9,000
Gasoline do.	27,243	31,943	32,045 ^r	32,300 ^r	30,000
Naphtha do.	7,480	8,806	7,489 ^r	8,075 ^r	9,000
Mineral jelly and wax do.	14	28	20 ^r	20 ^{r, e}	20
Jet fuel do.	15,152	16,696	14,168 ^r	14,725 ^r	17,000
Kerosene do.	62	70	93 ^r	100 ^r	70
Distillate fuel oil do.	36,300	42,127	40,672 ^r	41,000 ^r	42,000
Refinery gas do.	2,891	3,416	3,612 ^r	3,640 ^r	3,500
Lubricants do.	1,239	1,120	1,190 ^r	1,225 ^r	1,200
Residual fuel oil do.	41,532	50,017	50,000 ^e	49,280 ^r	50,000
Bitumen do.	2,491	3,133	3,066 ^r	3,091 ^r	3,200
Petroleum coke do.	721	897	886 ^r	900 ^e	900
Other do.	154	462	707 ^r	770 ^r	500
Refinery fuel and losses do.	5,922	7,126	7,434 ^r	7,455 ^r	7,000
Total do.	147,616	174,727	170,221 ^r	171,490 ^r	173,000

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. -- Zero.

¹Table includes data available through May 2004.

²In addition to the commodities listed, other crude construction materials are produced, but no basis exists for estimation of production.

³Reported figure.

*Revised on October 20, 2005.

TABLE 2
GREECE: SELECTED INDICES OF PRODUCTION FOR MINES

(1995 index = 100)

Sector	2000	2001	2002	2003
Mining and quarrying	109.3	107.7	117.5	111.9
Mining of coal and lignite	113.1	118.1	125.4	121
Extraction of crude petroleum and natural gas	62.9	47.7	44.9	34.1
Mining of metal ores	100.5	116	138.4	100.4
Other mining and quarrying	115.1	104	114.2	118.1

Source: National Statistical Service of Greece, 2004, Production Index for Mines, table B, page 1.

TABLE 3
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina		Aluminium de Grèce S.A. (Pechiney of France, 60%)	Agios Nikolaos, Boeotia area	750
Aluminum		do.	do.	160
Asbestos		Hellenic Mineral Mining Co. S.A.	Mines at Zidani, near Kozani	100
Barite, BaSO ₄		Silver & Baryte Ores Mining Co. S.A. (S&B) (Eliopoulos-Kyriakopoulos Group)	Milos Island	1
Bauxite		do.	Mines at Phocis, plants at Phocis and Itea	2,000
Do.		Eleusis Bauxites Mines, S.A.	Mines near Drama, Itea, and Phthiotis-Phocis	300
Do.		do.	Plants in Aghia Marina, Drama, and Itea	400
Do.		Delphi-Distomon S.A.; Hellenic Bauxites of Distomon S.A. (Aluminium de Grèce S.A.)	Open cast mines at Delphi-Distomon area	500
Bentonite:				
Crude		Mediterranean Bentonite Co. S.A. (Industria Chemica Mineraria S.p.A., Italy)	Surface mines on Milos Island	20
Do.		Mykobor Mining Co. S.A. (Silver & Baryte Ores Mining Co. S.A.)	Mines at Adamas, Milos Island	300
Do.		do.	Plants at Adamas, Milos Island	200
Do.		S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Mines at Adamas, Milos Island	600
Processed		do.	Plant at Voudia Bay, Milos Island	400
Cement		Halkis Cement Co. S.A. (Blue Circle Industries Plc., 72.65%)	Micro-Vathi plant, west-central Euboea Island	3,000
Do.		Halyps Cement S.A. (Ciments Français, France)	Paralia Aspropyrgos plant, Athens	800
Do.		Heracles General Cement Co. S.A. (Blue Circle Industries Plc., 54.48%)	Plant at Milaki	1,900
Do.		do.	Plant at Volos	4,600
Do.		Titan Cement Co. S.A.	Elefsis plant, Athens area	400
Do.		do.	Kamari plant, Boeotia	2,600
Do.		do.	Patras plant, northern Peloponnesus	1,900
Do.		do.	Salonica plant, Salonica	1,650
Chromite		Financial-Mining-Industrial and Shipping Corp. (FIMISCO) (IRO)	Tsingeli Mines and plant near Volos	25
Ferroalloys, ferronickel, Ni content		General Mining & Metallurgical Co. S.A. (Larco) (IRO)	Larymna metallurgical plant	25
Gold, Au in concentrate	kilograms	TVX Hellas (TVX Gold Inc., Canada)	Kassandra Mines, Olympias	5,000
Gypsum		Lava Mining & Quarrying Co. S.A.	Altsi, Crete Island	500
Do.		Titan Cement Co. S.A.	do.	280
Hunite/hydromagnesite		Microfine S.A.	Mines in Kozani Basin	100
Lead, mine, Pb in concentrate		TVX Hellas (TVX Gold Inc., Canada)	Kassandra Mines (Olympias, Stratoni) northeastern Chalkidiki	30
Lignite		Public Power Corporation (Government)	Aliveri Mine, Euboea Island	420
Do.		do.	Megalopolis Mine, central Peloponnesus	7,000
Do.		do.	Ptolemais Mine, near Kozani	28,000
Magnesite, concentrate		Viomagn-Fimisco Ltd. (Violignit S.A., 65%, and Alpha Ventures, 35%)	Mines at Gerorema, Kakavos, and Mantoudhi, northern Euboea Island	250
Do.		Grecian Magnesite S.A.	Mine and plant at Yerakini, Chalkidiki	200
Manganese, battery-grade MnO ₂		Eleusis Bauxite Mines Mining, Industrial and Shipping S.A. [National Bank of Greece (OAE)]	Nevrokopi, Drama	10
Marble, slab	cubic meters	Aghia Marina Marble Ltd.	Pallini	100,000
Do.	do.	Chris G. Karantanis & Sons Co.	Korinthos	60,000
Natural gas	million cubic meters per day	Public Petroleum Corporation (Government)	Prinos offshore gasfield and oilfield, east of Thasos Island	125
Nickel, ore		Larco (IRO)	Agios Ioannis Mines near Larymna	500
Do.		do.	Mines at Euboea Island	2,500

TABLE 3--Continued
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Nitrogen, N content of ammonia		Phosphoric Fertilizers S.A.	Nea Karvall	150
Perlite		S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Mines on Kos and Milos Islands; plant at Pireaus	300
Do.		Otavi Minen Hellas S.A. (Otavi Minen AG, Germany)	Milos Island	150
Do.		Bouras Co.	Kos Island	50
Petroleum, refined	42-gallon barrels per day	Hellenic Aspropyrgos Refinery S.A.	Aspropyrgos	95,000
Do.	do.	Motor Oil (Hellas) Corinth Refineries S.A.	Aghii Theodori, Corinth	140,000
Do.	do.	Petrola Hellas S.A.	Eleusis	100,000
Do.	do.	Thessaloniki Refining Co. A.E.	Thessaloniki	76,000
Pozzolan (Santorin earth)		Lava Mining & Quarrying Co. (Heracles General Cement Co. S.A.)	Xylokeratia, Milos Island	600
Do.		Titan Cement Co. S.A.	do.	300
Pumice		Lava Mining & Quarrying Co. (Heracles General Cement Co. S.A.)	Yali Island	100
Quartz		do.	Adamas, Milos Island	150
Steel, crude		Halyvourgia Thessalias S.A. (Manassis Bros. and Voyatzis S.A., 65%; National Investment Bank for Industrial Development, 35%)	Steelworks at Volos	1,500
Do.		Halyvourgiki, Inc.	Steelworks at Eleusis	1,200
Do.		Hellenic Steel Co.	Steelworks at Thessaloniki	1,000
Do.		Corinth Pipeworks	Steelworks at Thisvi	680
Do.		Sidenor S.A. (also known as Halivourgia Voriou Ellados S.A.)	Steelworks at Volos	600
Do.		do.	Steelworks at Corinth	245
Zeolite		S&B (Eliopoulos-Kyriakopoulos Group)	Mine at Pendalofos; plant at Ritsona	100
Zinc, mine, Zn in concentrate		TVX Hellas S.A. (TVX Gold Inc., Canada)	Kassandra Mines (Olympias and Stratoni), northeastern Chalkidiki	30